SOIL TEMPERATURE AND WHEAT.

Farmers' Bulletin 1224, "Wheat Scab and its Control," brings out the following facts in connection with the relation of temperature to growth of plants and development of scab.

Wheat seedlings grow best and develop into stocky, healthy plants with a well-developed root system, when the temperature of the soil is about 40° to 60° F. On the other hand, the wheat-scab parasite is a warm-weather fungus, and grows best where the air and soil temperatures are about 70° to 84° F.

The seedling blight develops chiefly from the scabbed kernels sown with the wheat. A warm and comparatively dry soil favors the development of the seedling blight, while a warm, moist air favors rapid growth of the fungus. Warm rainy weather during flowering greatly favors the development of the head blight.

By seeding winter wheat at the latest safe date in the fall, and spring wheat at the earliest safe date in spring, when the soil is moist and cool, with a soil temperature of about 40°, the conditions are most favorable for the development of a good stand of deeply rooted, vigorous wheat seedlings, free from seedling blight. Such plants develop rapidly and mature early.—*J. W. S.*

RELATION OF SOIL TEMPERATURE TO ONION SMUT INFECTION.

Onion smut was first noticed in the Connecticut River Valley in 1869. Since that time it has spread throughout the northern onion growing sections from New York to Oregon, but has not appeared in the southern producing areas of Louisiana and Texas. This segregation of the disease suggested climatic conditions as the principal contributing factor, and some experiments were conducted by Messrs. Walker and Jones, of the Bureau of Plant Industry, to determine the cause of this pronounced geographic distribution of the disease. (See *Journal of Agriculture Research*, Oct. 29, 1921, Vol. XXII, No. 5.)

It was found that some variation in infection occurred with different degrees of moisture, but the moisture conditions did not appear as a serious limiting factor in onion smut infection.

The relation of soil temperature to the development of the host and the parasite was studied under controlled conditions, which gave some very interesting and important results. Seed germinations and growth took place over a range of soil temperature from 10° to 31° C. The most rapid germination and developments of tops occurred with soil temperatures of 20° to 25° C., and the best developments of roots below 20°.

A high percentage of plants grown on smutted soil was infected at soil temperatures ranging from 10° to 25° C. A decided reduction in infection was noticed at about 27°, and complete freedom from the disease resulted at 29°. The air temperature was uniformly from 15° to 20° C.

Successive out-of-door plantings at Madison, Wis., made in inoculated soil during the growing season, resulted in a gradual reduction of infection as the season advanced and the soil temperature rose. Complete freedom from smut was attained when the daily mean soil temperature at 1 to 2 inches depth remained at or slightly above 29° C. for two or three weeks. There was also a tendency, as the temperature rose, for the seedlings to outgrow the disease by the sloughing off of the diseased cotyledons before infection of the first leaf occurred.

It appears that the regional distribution of onion smut in the United States is conditioned upon the soil temperature during the seedling stage of the plant's growth, the infection and development of smut being favored by the relatively low temperatures and inhibited by the high temperatures, with approximately 29° C. as the critical point.—*J. B. K*

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HEAVY SNOWSTORM IN SOUTHERN MICHIGAN, NOVEMBER 8-9, 1921.

D. A. SEELEY, Meteorologist.

[Weather Bureau, Lansing, Mich., Dec. 23, 1921.]

The heaviest snowstorm ever recorded in this vicinity occurred November 8 and 9, 1921. The total fall at Lansing was 18.9 inches in less than 36 hours.

The storm was not only unusual as to the amount of snowfall, but also from the fact that it came so early in the season. Previous to this storm there was no record of any snowfall in November exceeding 10 inches.

The snowfall, as shown on the accompanying chart, was heaviest in this immediate section. A strip about 50 miles wide extending from east to west across the south-central part of the State was the only section where the snowfall was heavy. In the northern parts of the Lower Peninsula none was recorded and there was but little in the southern tier of counties.

The weather map on the morning of November 7 indicated the development of a low-pressure area over Colorado. The pressure was high from Lake Superior westward. During the following 24 hours the Colorado LOW moved eastward and was central on the morning of the 8th over northern Missouri, whence it moved slowly up the Ohio Valley. Snow began falling at Lansing at 10:00 p. m. on the 7th, although the center of the low area was still well to the southwestward with clear weather in the Ohio and Mississippi Valleys. Snow continued heavily all day on the 8th, with the temperature slightly below freezing. Meanwhile the high-pressure area moved southeastward over the trans-Mississippi region.

The weather map seems to indicate that moisture for the heavy snowfall was furnished by outflowing upper currents from the low-pressure area to the southwest. Temperatures were high near the storm center and moderately low in the Lake Superior region, in connection with the high pressure. The probability is that this cold air moving in from the north at the surface and mixing with the warm and moist air outflowing from the low-pressure area above produced the large amount of snowfall.

The pilot-balloon observation made at this station on the afternoon of November 7 showed a backing of the wind from north at the surface to west at elevation of 1,350 meters, where heavy St.-Cu. clouds were entered. This rather supports the theory in regard to the sources of moisture just mentioned.

The distribution of snowfall in Lower Michigan is shown by figure 1.

DISCUSSION.

By A. J. HENRY.

The phenomenon described by Mr. Seeley is of more general occurrence than might be supposed; it falls within the class of what might be called islands of greater